Attachment 1 to
OXC-10294-66

ITEMS IN MODIFYING ENGINEERING SYSTEM 001
OF AN/APQ-93 TO FIELD FLIGHT CONFIGURATION

~5 mos. $2,000

1. Fabricate new transmitter, Requires all new parts, except transformers and pulse forming network from breadboard transmitter can be used.

2. Modify mounting panel from 8 feet to 6 feet, assemble spare modules to panel, rework F101 modules for high temperature to replace spare modules.

3. Inspect and rework breadboard synchronizer, particularly the frequency generator.

4. Fabricate parametric amplifier, including power supplies, pump tube and interconnections.

5. Fabricate doppler frequency tracker board.

6. Fabricate receiving TWT assembly (TWT is available from system 001).

7. Obtain fiberglass pressure vessel (F101 used heavier but cheaper stainless steel vessel). Waveguide 10-15#

8. Fabricate an additional set of interconnecting waveguide for spares (2 complete sets are now available).

9. Update the third frame for system modifications of the last three years. (Third frame was used only for initial fit check in 1964, has not been maintained current.)

10. Increase in rate of expenditure for spares replacement. If spares are returned to original quantity, no increase in quantity is foreseen. However, since an additional system will be active, the failure of components will increase and require a somewhat higher replacement rate.

~$200,000.00 or less.

4/14/66

Att. 2

Tasks on Activation of Field Flight Test on AN/ARQ-93 Radar

		Elapsed Time
I	Set up laboratory	
	A. Ship 2 systems, ground support equipment, second detail correlator, and spares on hand in Baltimore.	2 weeks
	B. Unpack equipment on arrival.	
	C. Transfer permanent field personnel 2	
	D. Install primary power distribution in lab.	
	E. Check-out test equipment	
	F. Establish test arrangement for frame, transmitter, and other units.	
	G. Obtain SF_6 and other materials.	
	~~H. Wire and install waveguide in aircraft~~ X3	
	I. Arrange for personnel housing	
II	Test system in laboratory	2 weeks
	A. Perform complete pre-flight on radar and instrumentation in lab to assure no damage from shipment and proper system operation.	
	B. Establish compatibility of recorder film with new chemistry of Versamat at site. Establish procedures with sensitometer (step wedge).	
	C. Establish CRT bias and video drive level for new chemistry	1 Day (15 may earlier)
	D. Install antenna, waveguide, hydraulic actuator and single axis platform in aircraft	1 Day
	E. Align antenna	1 Day
	F. Pressure test antenna and waveguide	½ day
	G. Set up second detail correlator in lab	
	H. Coordinate pre-flight and flight plans and procedures with flight operations and pilots	

I. Set in programmer operation for initial flights

J. Check mechanical alignment and electrical operation of tracker camera. (Requires special 9 bay hatch with window)

III Test system in aircraft — 3 weeks

A. Check out aircraft cabling — (3 days)

1. Inspect mechanical cabling and connectors

2. Check electrically for proper voltages and input signals

B. Establish correct scale factors and polarity of INS inputs to radar - antenna stabilization (yaw and pitch inputs), single axis platform (roll input) and film drive (ground speed input). — (3 days)

C. Check operation of digital magnetic tape recorder as operated by radar. Check usefulness of data read-out from recorder. — (1 day)

D. Perform full pre-flight — (3 days)

a four

NOTES: 1. Estimated elapsed times are effective only after 15 May 1966 when single axis platform connector change, stale gain change, and other minor improvements are complete and the two delivered systems are regularly pre-flighted to determine and maintain their readiness.

2. Total elapsed time can be shortened from 7 weeks to 5 weeks or less if Basis 1 of setting up laboratory can be accomplished prior to the actual activation go-ahead. This would entail an increase in costs beyond that given in proposal J0194-75.

3. Further reduction in elapsed time can be accomplished by round-the-clock work in Westinghouse, vehicle, and INS personnel. With good cooperation, this could be reduced to approximately three weeks, although this procedure obviously reduces the effectiveness of overtime to overcome unexpected problems.

4/14/66

Attachment 3 to -
OXC-10294-66

Objectives of Field Flight Test of AN/APQ-93 Radar

I Determination of system performance through ground tests and measurements (transmitter power, receiver noise figure, film drive, etc.) to establish compatibility of AN/APQ-93 radar with

A. aircraft primary power

B. aircraft hydraulic system

C. inertial navigation system

1. antenna motion compensation
2. single axis platform roll stabilization
3. film motion

D. digital magnetic tape recorder

II Determination of system performance through instrumentation and radar mapping data in flying at 40,000 feet altitude (same as high altitude flights with F-101) to determine compatibility with aircraft environment, particularly vibration, accelerations along antenna beam, and cooling.

III Determination of radar performance at the aircraft final altitude primarily through analysis of radar mapping data, checking in particular

A. effect of clutter from first and third time around echo.

B. sensitivity, as indicated by return from corner and spherical reflector targets and from area targets such as grassland and trees.

C. resolution, as indicated by specific point targets and separation of corner reflectors.

D. antenna positioning by the doppler frequency tracker

E. performance of single axis platform accelerometer in correcting for aircraft motion

F. spectrum of doppler frequency returns to optimize centering of offset frequency

G. receiver gain and limit levels to optimize dynamic range of returns

H. effect of aircraft variations of ground speed, pitch, roll, and drift

IV Obtaining radar data for interpretation and analysis of specific targets.